

## REMARKS/ARGUMENT

Substitute drawings are submitted herewith under cover of a letter to the Official Draftsperson. It is believed that the lines and reference numerals in the new drawings are sufficiently dark to meet PTO requirements.

A substitute specification is filed herewith. This is an exact copy of the specification and claims as filed with no additional subject matter, and is thus in compliance with 37 C.F.R. 1.125(a).

Claims 1, 5, 10, and 14-17 have been amended to better highlight the distinguishing features of the invention, and to improve the form thereof. The scope of these claims has not, however, been changed. Also, new claims 18-22 have been added to provide applicants with additional protection to which they appear to be entitled in view of the prior art.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1-3 as anticipated by US Patent 3,840,169 (Steranko). As the Examiner has recognized, Steranko discloses apparatus for wiring circuit boards, and not for forming electrical connections between a semiconductor chip and a leadframe. Thus, the work holders of Steranko are not "configured to support a leadframe . . ." as specified in claim 1 as amended, but to hold printed circuit boards. Steranko accordingly does not anticipate claim 1.

New claim 22 is similar to claim 1 as amended in that it calls for work holders configured to support a leadframe. However, this claim also specifies that the bond heads each include an ultrasonic transducer. Steranko uses solder heads, and not ultrasonic transducers to form solder bonds in its wiring process. Claim 22 is accordingly not anticipated by Steranko for this additional reason.

New claim 18, which is dependent on claim 1, calls for "a structure operative to isolate each work holder from vibration of the other work holders". There is no teaching or suggestion in Steranko that the gaps should be provided to isolate each work holder from the vibration of another work holder. The Examiner's presumption that Steranko provides isolation from vibration is belied by the fact that a soldering head produces little or no vibration as compared to an ultrasonic transducer as used in the invention. Claim 18 should be allowed for this additional reason.

Like new claim 22, new claim 19, which is dependent on claim 1, specifies that:

each of the bonding-heads includes an ultrasonic transducer by which the bonding operations are performed. . .

and is therefore patentable for the same reasons as claim 22.

Claims 2 and 20, respectively dependent on claims 1 and 19, specifically recite gaps to isolate each work holder from vibration of the other work holders, and claims 3 and 21, also respectively dependent on claims 1 and 19, specifically recite gaps between the work holders, and further call for vibration-insulating material between each work holder base and the common lower chassis on which they are supported. There is no teaching or suggestion of this in Steranko.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1 and 4 as anticipated by US Patent 3,973,713 (Furuya). Claim 1 calls for:

a plurality of bond-heads [and]

a plurality of work holders, each associated with a respective one of the bond-heads.

Furuya does not show a wire-bonding apparatus comprising a plurality of bond-heads. The first of the tables in Furuya (which the Examiner equates to the claimed work holders), supports a measuring device 1. This is used by computer 10 to calculate positions for bonding the wires to the semiconductor, and to record the calculated information on a magnetic tape cassette (see Fig. 1, and description in Cols. 2 and 3), but the apparatus shown does not have multiple bond-heads.

There is a suggestion at Col. 3 lines 26-36 of the reference to include further wire bonding devices, but they are clearly not intended to be part of a single integrated structure operated by a single controller. In fact, at Col 3, lines 8-36, the patent states:

Thereafter, each workpiece removed from the measuring device 1 is set on the wire bonding device 7, with the corresponding cassette tape removed from the mini-computer 10 and set on the numerical control device 11, so that the wire bonding device 7 sequentially carries out a wire bonding operation according to the information from the cassette tape.

Since, as shown in FIG. 1, the measuring device 1 and the wire bonding device 7 are separate from each other, the measurement of pellet-bonded positions may be made continuously even during

wire bonding operation of the bonding device 7. Accordingly, a plurality of wire bonding devices 7 may be provided, and sets of workpieces, on which the measurement is carried out, and the cassette tapes, which store information indicative of the predetermined and calculated positions, may be distributed among the plurality of wire bonding devices 7. Moreover, many such bonding devices 7 may be controlled by a single operator because the wire bonding device 7 operates fully automatically except for the replacement of and magazines of magnetic tapes for the loader and the unloader.

Claim 1 as amended (and also new claim 22) call for "a controller which is programmable to operate each bond-head of the apparatus..." From the text quoted above, it is clear that additional bond-heads in Furuya would be part of wholly separate and independent work stations controlled by separate computers, and not an integrated device operated by a single controller. Accordingly, claims 1 and 22 are not anticipated by Furuya.

Claim 4 is dependent on claim 1, and is patentable over Furuya for all the reasons stated above. In addition, there is no teaching or suggestion of a track and indexer in the reference.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1, 2, 4-9 and 14 as anticipated by US Patent 4,301,958 (Hatakenaka). As noted above, claims 1 and 22 call for a wire-bonding apparatus comprising:

a plurality of bond-heads;

a plurality of work holders, each associated with a respective one of the bond-heads... [and]

a controller which is programmable to operate each bond head of the apparatus of the apparatus independently to perform bonding of wires between a semiconductor chip and a leadframe simultaneously with the other bond-heads but without synchronization of movement between the bond-heads.

Hatakenaka describes an in-line assembly system having a plurality of separate wire-bonders 5a, 5b, 5c, each having only a single bond-head. The patent notes at Col. 5, lines 37-46 that several wire bonders are required for a single die bonder 3 because the operating speed of the die bonder is greater than that of the wire bonder. Each of the wire bonders therefore serves both a lead attaching

function, and also to convey unbonded lead frames downstream to the next wire bonder. Accordingly, there is no single controller in Hatakenaka that operates multiple bond-heads of a single bonding machine independently of each other. Claims 1 and 22 are therefore not anticipated by Hatakenaka

Claims 2, 4-9 and 14 are dependent on claim 1, and are not anticipated by Hatakenaka for the same reasons stated above.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1-9 and 14 as anticipated by JP 05218124E (Nomura). As in the case of the Hatakenaka patent, Nomura discloses a plurality of wire bonding units C1-C3 in an assembly line, wherein each unit has a single bond-head 202 (see for example, Figs. 3-5). It likewise does not anticipate claims 1 and 22.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 10-13 as obvious over Furuya in view of US Patent 4,407,416 (Anderson). As claims 10-13 are directly or indirectly dependent on claim 1, they are not anticipated by Furuya or the reasons stated above. Moreover, in relation to claim 10, there is no description in Anderson relating to storing devices to drive mechanical components within the cardcage.

In relation to claim 11, there is no teaching regarding controlling each bond-head using a separate controller board.

In relation to claim 12, there is no teaching that each controller board includes a heat sink.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 10-13 as obvious over Nomura in view of US Patent 6,108,204 (Brotherton). In addition to the reasons already mentioned above with respect to the relevance of Nomura to independent claim 1, Brotherton describes a cooling system for a processor, specifically to mount a heat sink on top of a CPU. In claim 12, each heat sink is included on a controller board.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 15 and 16 as obvious over Nomura in view of 'US Patent 4,821,844 (Tsumura). Tsumura only discloses a wire bonding method and types of wires useable with this method. As explained above, Nomura does not anticipate claim 1 because it does not disclose a wire-bonding apparatus with a plurality of bond-heads. Hence, Nomura read in combination with Tsumura do not disclose or render

obvious the bonding of different types of wires or wires with different diameters simultaneously, and/or on a single wire-bonding apparatus.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 16 and 17 as obvious over Nomura in view of US Patent 5,839,640 (Kinnaird). Claims 16 and 17 are dependent on claim 1 and are novel and inventive relative to Nomura for the reasons stated above. Kinnaird does not remedy the deficiencies in Norura, and in fact discloses a solution to an entirely different problem, namely; that of capillaries bonding over only a limited angle. Thus, there is a need to have two capillaries on the same machine with different capillary orientation (see Col 1, lines 14-18).. There is in any event no mention of using the different capillaries to conduct bonding of wires of different diameters simultaneously (Kinnaird appears to be directed to bonding with the same wire, albeit using different capillary orientations), as in claim 16, or bonding using different patterns simultaneously, as in claim 17.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 15-17 as obvious over Hatakenaka in view of US Patent 5,189,507 (Cariomagno). As these claims are dependent on claim 1, they are patentable over Hatakenaka for the reasons stated above.

Carlomagno does not remedy the deficiencies in Hatakaenaka because Carlomagno only discloses that bonding wires can have different diameters, and bonding wires can be employed to form different patterns. However, Carlomagno does not disclose the making of bonds with different diameters or different patterns simultaneously as recited in claims 15-17.

In view of the foregoing, favorable reconsideration and allowance of this application are respectfully solicited.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Asst. Commissioner for Patents, Washington, D.C. 20231, on January 16, 2003:

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Date of Signature

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